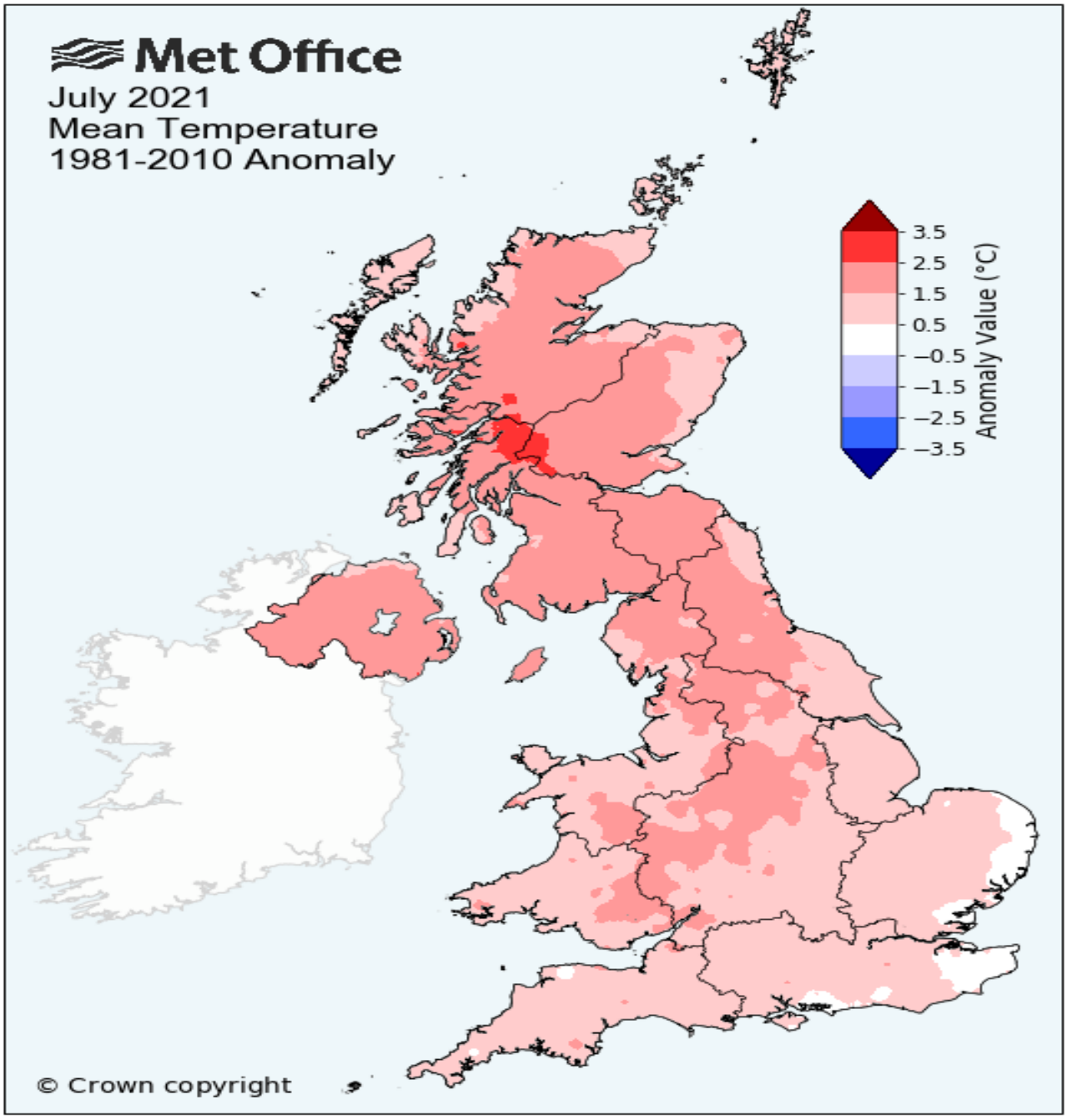
Heatwave helps mark fifth warmest July on record

Description

The mid-month heatwave has helped the UK to its joint fifth warmest July on record according to provisional Met Office figures, with Scotland and Northern Ireland recording their third warmest July, in a month where Northern Ireland also broke its all-time high temperature record, exceeding 31C multiple times.

The mean temperature for July 2021 in the UK was 16.6°C, which put it level with July 1995's figure, although still some way short of the record figure of 17.8C in 2006. Northern Ireland (16.4° C) and Scotland (15.1°C) saw their third warmest Julys, Wales (16.5°C) its ninth warmest and England (17.5°C) its eleventh warmest.



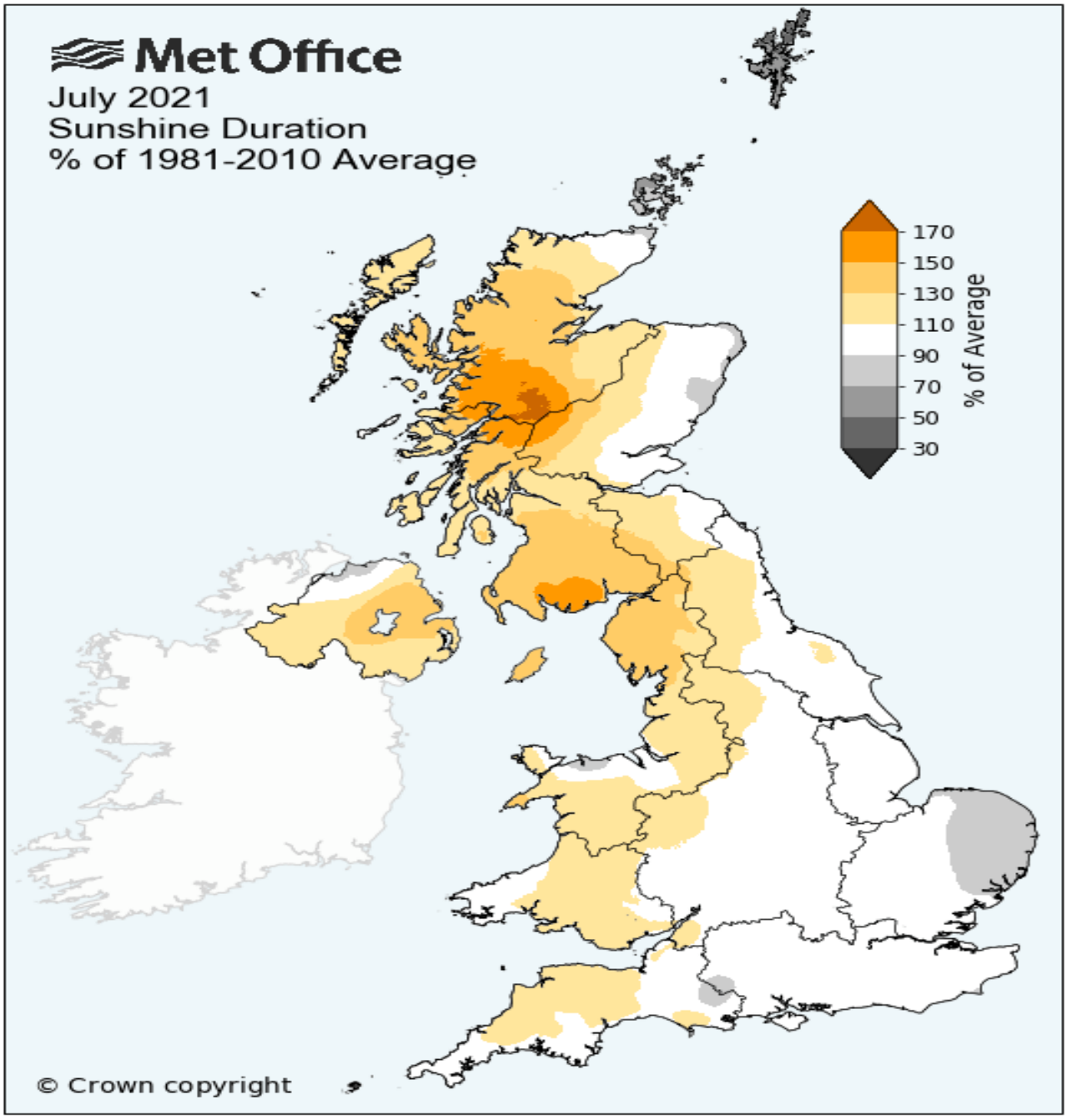
July 2021 mean temperature map

While the high mean temperatures were spurred on by the mid-month heatwave, the figure was helped to its elevated position in the standings with notably high night-time temperatures recorded across the month, with the average minimum temperature for the UK putting it at joint-second for the warmest recorded in July, at 12.1°C.

Of course, most people will remember July 2021 for the heatwave during the middle of the month, which saw the Met Office issue its first ever extreme heat warning. Western areas in particular got the most consistently hot conditions, and Northern Ireland even broke its all-time temperature record with a figure of 31.3°C recorded at Castlederg on 21st *.

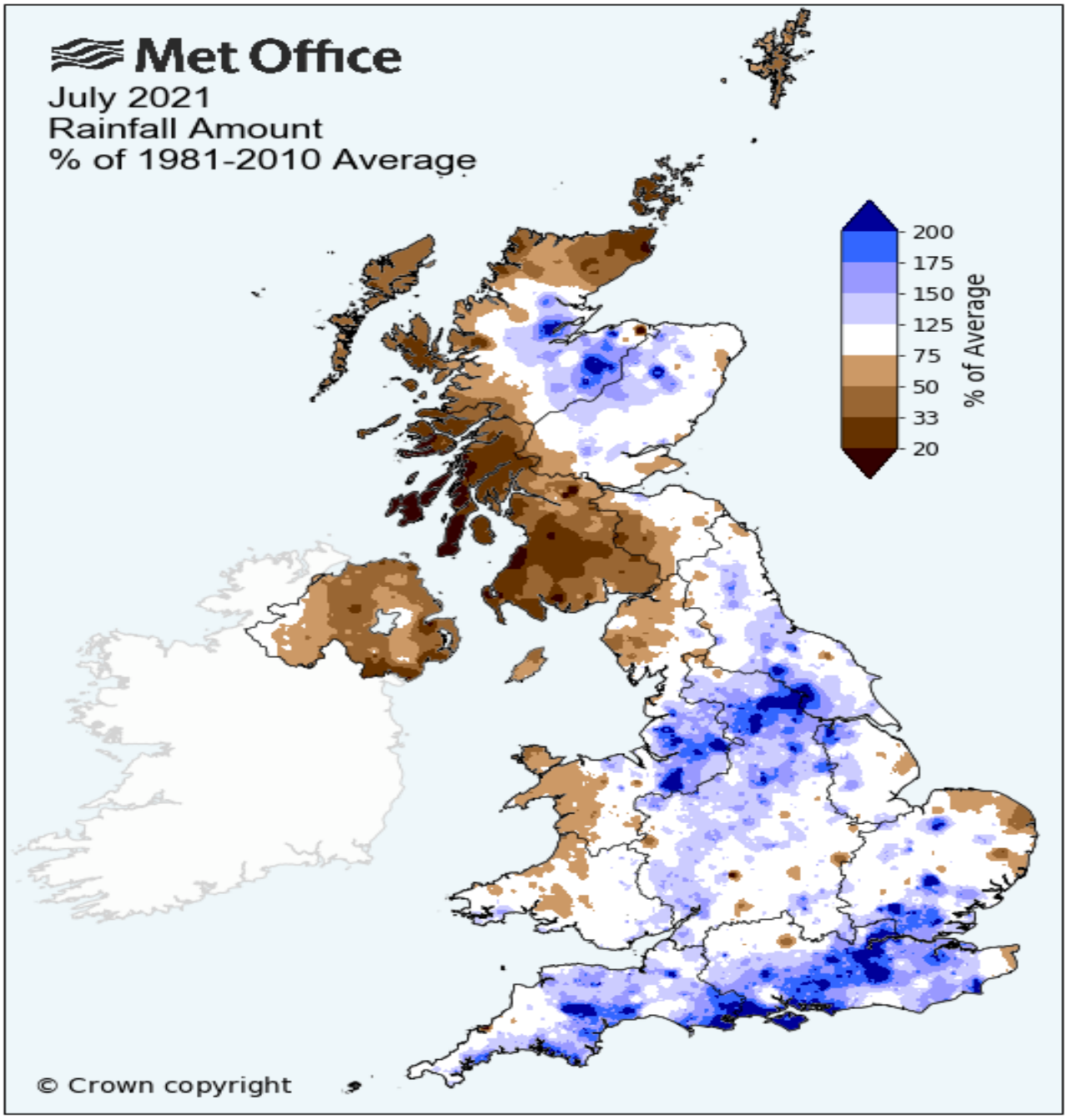
Both Scotland and Northern Ireland had average maximum temperatures for the month in their top 10 ever recorded, with 21.2°C in Northern Ireland being the fifth highest and 19.2°C in Scotland being their sixth highest.

On a similar theme, Scotland and Northern Ireland were also far drier and sunnier than average for July. Both countries saw 25% more sunshine hours than average, with 175.6 sunshine hours for Scotland, and 175.5 for Northern Ireland. Scotland got 67% (66.4mm) of average rain in the month, while Northern Ireland got just 53% (43.3mm).



July 2021 average sunshine hours map

Despite the dry month for western areas in particular, intense summer downpours affected some areas of the country and resulted in some places exceeding twice their average rainfall for July. The Isle of Wight had its seventh wettest July on record – and its wettest since 1920 – with 115.4mm of rain, while parts of London recorded more than double the average rainfall they'd expect in the month. The localised nature of some of the summer downpours meant there could be some sharp contrasts with, for example, some parts of London receiving much closer to average rainfall.



July 2021 rainfall amount map

In addition, despite the mid-month heatwave, some unsettled and thundery conditions were in force for much of the second part of the month, which even saw Storm Evert named and sweep across southern areas of England and Wales, bringing with it gusty winds and some persistent rain.

Tim Legg of the National Climate Information Centre said, “Early July was relatively unsettled, with frequent heavy showers, especially over parts of England. The early subdued temperatures were replaced with a very warm spell for much of the UK as a high pressure system moved in and settled down, resulting in temperatures regularly getting in to the low 30s Celsius by day and remaining warm overnight.

“The hot spell is largely responsible for the above average temperatures recorded for the UK, with western areas in particular reporting temperatures well above their July averages. This warm period broke down later in the month, bringing with it rain, thunderstorms and even the first storm we’ve named in July when Storm Evert crossed our shores from the 30th.”

Provisional July 2021	Mean temp (°C)		Sunshine (hours)		Rainfall (mm)	
	Actual	Diff from avg (°C)	Actual	% of avg	Actual	% of avg
UK	16.6	1.5	191.6	111	72.5	93
England	17.5	1.2	200.7	104	78.3	125
Wales	16.5	1.4	203.4	114	79.7	86
Scotland	15.1	1.8	175.6	125	66.4	67
N Ireland	16.5	1.9	175.5	125	43.3	53

** A provisional temperature of 31.4 C was recorded at Armagh on 22nd July, which did not pass all subsequent verification checks*.

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August 2021

Europe needs to prepare for temperatures of 50C in future

Description

Syracuse, in Sicily, has provisionally exceeded the previous European highest temperature with a record of 48.8°C yesterday. If the record is confirmed by the World Meteorological Organization, this temperature will break the previous record of 48.0°C in Athens in 1977.

It will also raise concerns that even higher temperatures are potential in future, possibly even exceeding 50.0C.

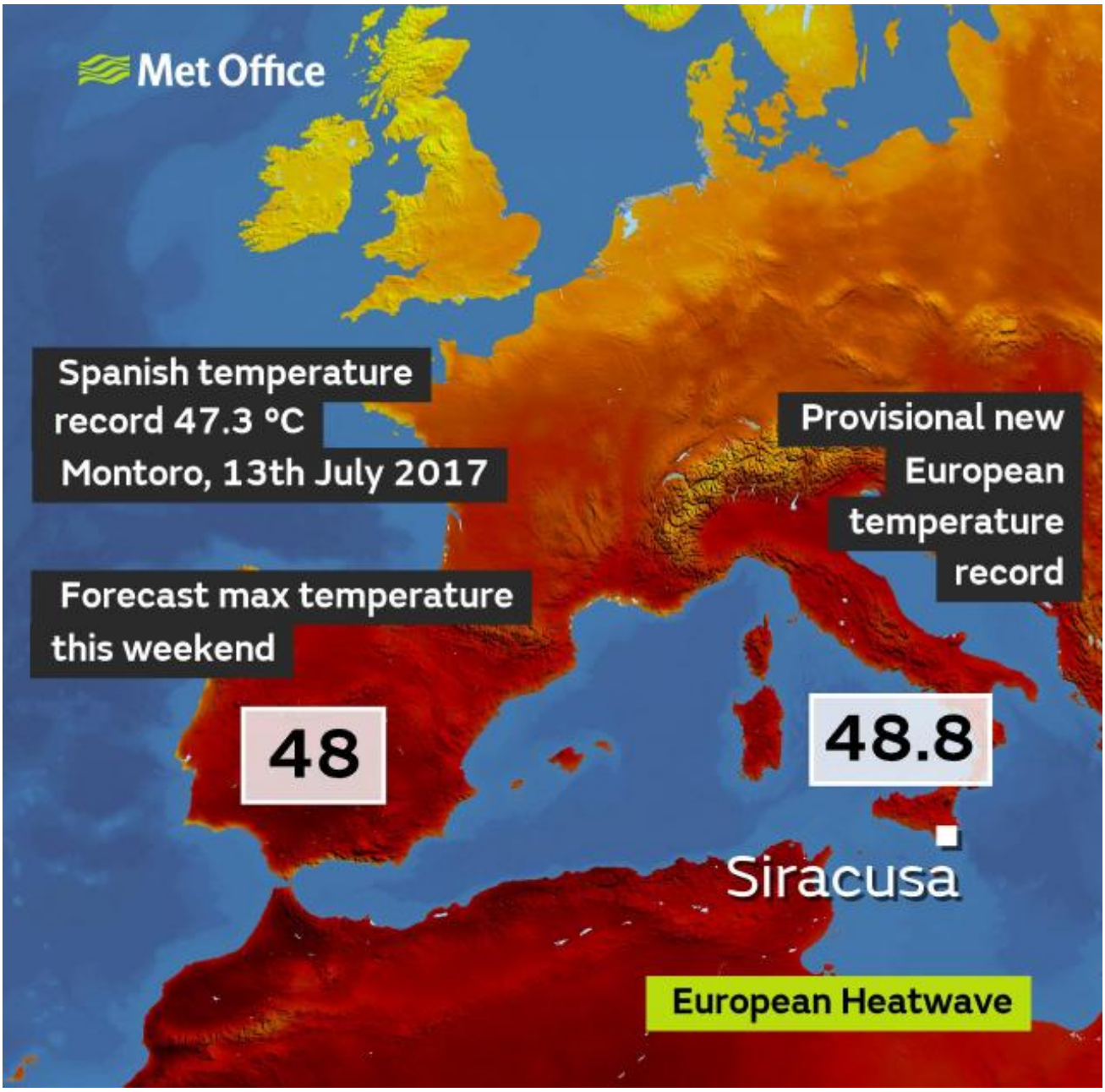
Professor Peter Stott is the Met Office's lead on climate attribution. He has studied European heatwaves for nearly two decades, including the notable ones in 2003 and 2019.

He said: "Climate change is making heat-related extremes of weather more intense and when we think about those record-breaking temperature the chance of breaking temperature records – or coming close to breaking records – is greatly increased.

"Record-breaking temperatures in June 2019 saw the French temperature record exceed 45.0°C for the first time, and our analysis found that event was at least five times more likely because of climate change. Although we haven't yet been able to run an in-depth study on the current situation, I think it's going to be clear that climate change has made this current event more extreme.

"The chances each summer of seeing really extreme temperatures are pretty high now. We can't say exactly when it is likely to happen, but Europe will need to prepare for the eventuality of further records being broken with temperatures above 50.0°C being possible in Europe in future, most likely close to the Mediterranean where the influence of hot air from North Africa is strongest."

The Earth's average surface temperature has risen by around 1.1°C since the pre-industrial period (1850-1900), but the average temperature in some regions has increased by a greater amount. The average temperature in North Africa, for example, has increased by around 2.0°C over the same period.



Potentially Syracuse has broken the European temperature record as heat builds further west into Iberia

Chris Almond is a meteorologist working with the Met Office's Global Guidance Unit. Commenting on the conditions leading up to this event, he said: "There is a large area of high pressure in the upper atmosphere affecting much of the Mediterranean, as well as northern Africa.

"High pressure leads to sinking motion in the atmosphere which compresses the air and heats it up, and this added to the heat from the sun can lead to very high temperatures at this time of year. Also under high pressure, winds tend to be light, so the heat doesn't get dispersed as much this also helps conditions to get hotter and hotter.

"This weather situation is not particularly unusual, high pressure often sits over these areas in the

summer – it's the temperatures which are more unusual, which are the result of many factors coming together at the same time.

"With climate change, we are expecting, and are already seeing, more frequent and severe events, and will continue to do in the future."

The exceptional heat in the central Mediterranean is building after extreme conditions in Greece and Turkey last week.

This heat is expected to extend into Iberia and Morocco through the next couple of days. Further national records could be achieved in the coming days, including for Spain, where the current record is 47.3C in Cordoba in 2003.

Chris Almond added: "A high wildfire threat continues, which could result in the rapid spread of new fires and limit containment activities of existing fires. It will be next week before temperatures are expected to slowly decrease across the region.

"Adverse human health impacts are likely, particularly to those exposed to the extreme heat for prolonged periods or are part of vulnerable population groups. This is combined with poor air quality in some places due to ongoing wildfires and smoke."

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August 2021

Met Office science at the heart of climate assessments

Description

The Met Office Hadley Centre – which celebrated its 30th anniversary last year – has a long and proud history of working and supporting the IPCC. Indeed, one of the foremost scientists who propelled the IPCC, serving as co-chair and chairman of its scientific advisory group from its inception until 2002, was the late Sir John Houghton.

Sir John was Met Office Director General/Chief Executive from 1983-1991 and was instrumental in establishing the Met Office Hadley Centre, which was formerly opened by the then Prime Minister, Baroness Margaret Thatcher, on 25 May 1990. This was the same day that the IPCC First Assessment Report was published.

Professor Peter Stott has been working on climate research at the Met Office since 1996.

Professor Peter Stott joined the Met Office in 1996, a date which coincidentally aligned with the publication of the IPCC's Second Assessment report. Before the days of widespread email use, Peter remembers fondly that this hefty volume arrived in a large envelope on the doormat at his home just before he started his Met Office career. He said: "Reading through the report, I immediately realised that this was the first official document to make a link between human activities and global warming, using the phrase that there was a discernible human influence on the global climate."

The following year, Peter attended the global climate conference in Kyoto. Peter said: "Those of us who went were able to present the Met Office Hadley Centre's work and the conclusions of that second IPCC report.

"It was an important moment because it was when governments first agreed to do something about climate change when they signed the Kyoto Protocol, based largely on the growing evidence from the IPCC's second report.

"So it was already recognised there was a human influence of greenhouse gas emissions on the climate, but it was still very early days for putting any precision on what that may mean in terms of impacts; such as extreme weather for example."

Peter added: "Looking back now to the late 1990s our predictions about global warming and global temperature rise were very accurate, even though we weren't able to rely on the vast supercomputer power that we have today.

"Though, relatively speaking, the information we had from those projections and what it may mean for rising sea levels or agriculture, for example, were very broad brush."

After two decades of scientific research and increasing technological capability, the sophistication and resolution of climate projections have increased enormously

Peter added: "It is only now with our climate models, that we can simulate climate aspects such as really heavy rainfall and extreme heatwaves at a regional level, putting a local precision on high-impact weather."

Commenting on the current impacts of climate change, Peter Stott added: "What we are now seeing in 2021 is the very clear effects of climate change playing out in real time, with floods, wildfires and heatwaves."

The sixth Assessment Report – published on 9 August 2021 – is the first IPCC report to state that it is unequivocal that human influence has warmed the atmosphere, ocean and land.

Peter added: "The latest IPCC report is a big step forward because it is laying out clearly the risks of climate change at least in terms of some of the irreversible impacts of climate such as sea level rise for example which will continue to rise for many centuries. We are still at the early stages of mapping out those risks.

"The better we can understand those risks the better we can mitigate them. That is a big challenge for societies now to be more resilient to heatwaves and other climate risks. The big challenges to come will include being able to provide more information about high-impact climate risks such as heavy

rainfall. This is an exciting development that will help us all be better prepared for what is coming at us in the future.

“New scientific information such as the latest IPCC report also helps governments as they seek to reach international agreements to reduce greenhouse gas emissions rapidly enough to avoid the worst effects of climate change.

“This historical and continued contribution the Met Office Hadley Centre has enjoyed with the IPCC acknowledges our status as a world-leading centre for climate science research and has helped to ensure that our observational datasets, climate modelling and peer-reviewed research is incorporated into the heart of the scientific assessments.”

Chris Jones has also recently been selected as an author for a future IPCC report, due for release in 2022. Chris said: “The IPCC represents the “go to” place to understand the state-of-the-science for policy makers and scientists alike. The rigour and comprehensiveness of the assessment brings together experts from all over the world. It’s been a huge honour, and immensely enjoyable, to be a part of this community activity.”

Bringing the Met Office’s journey with the IPCC to a full circle, during the press conference for the latest Sixth Assessment Report (AR6) publication, IPCC Chair, Hoesung Lee, announced that the report is dedicated to the memory of Sir John Houghton.

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Invoking the oak – nature's veteran recorder helping scientists understand the rate and scale of climate change

Description

Ancient oak trees – individuals more than 400 years old – extend back into the deep and dark recesses of history.

During that time, these senior trees will have been surrounded by huge fluctuations in climate; to say nothing of the monumental changes in human history and how we have modified landscapes.

For those that can read them, the patterns of tree rings can provide a hint of past seasons, since the growing trees lock in valuable data about the climate for every year of their life.

Oak trees can live for centuries, providing a climate record spanning their lifetime but by monitoring the living tree and recording factors the first appearance of leaves and when the tree becomes bare can provide climatologists with a raft of data the current growing season. During 2020, the growing season for pedunculate oak was extended in the UK by 12 days. Picture: Ted Green/WTML (Woodland Trust media library).

However, that is not the only assistance that oak trees can provide to those researchers looking to

understand more about our climate and how it is changing. By observing and charting the changes when individual trees come into leaf or shed their leaves, scientists and climatologists can glean valuable data about fundamental shifts in climate since individual plants respond to the shifting waves of weather and climate patterns from one year to the next.

Meteorologists have often been interested in how the weather and climate have profound impacts on phenology: the study of recurring events in nature and their relationships with climate. And indeed in 1875 the (Royal) Meteorological Society embraced the timing of natural events within the growing interest of phenology.

Dr Debbie Hemming is a Met Office scientist conducting research to improve understanding and modelling of the interactions between vegetation and climate. She said: “Trees and other species are natural data stores. They can be used in so many ways to inform us about the past and present of our changing world.”

With climate change already affecting the world, including the UK, there is a rapidly expanding interest in phenology and how the timing of natural events are responding to climate shifts, like rising temperatures and fluctuations in rainfall patterns.

For 31 years the BAMS Global State of the Climate report has been monitoring climate trends to provide a snapshot of the shifts in global and regional climate. The latest report is published today [25 August 2021] covers 2020.

Using results from phenology studies across the globe, the report states the seasonal cycle of vegetation across the Northern Hemisphere showed a generally earlier spring and later autumn (fall) in 2020 compared to recent decades. These differences were larger across Eurasia than North America.

Debbie Hemming added: “Satellite observations analysed by colleagues at the NASA Ames Research Centre, in the United States, showed that about 55 per cent of the Northern Hemisphere experienced an earlier spring and about 65 per cent a later autumn (fall) in 2020 compared to recent decades.”

Volunteer citizen scientists can make valuable contributions to the understanding of our changing climate by making phenological records. Picture: Michael Hefferman/WTML (Woodland Trust media library).

One UK study – involving citizen scientists from the Woodland Trust's Nature Calendar project – has been charting the duration of leaves on the pedunculate oak from first leaf to bare tree. The pedunculate oak – colloquially known as the English oak – actually has a range across much of temperate Europe and Asia Minor, and it is the national tree of several European nations, not solely the UK.

Oak trees came into leaf across the UK earlier in 2020 than in any of the previous 20 years.

The average first 'leaf date' for the 2000–09 baseline was 26 April (day 116), and average 'bare tree' date was 30 November (day 334), giving a 218-day growing season.

Both events are strongly influenced by temperature; the first leaf date advances by approximately six days for every 1°C increase in mean February–April temperature; and the 'bare tree' date is delayed by approximately three days for every 1°C increase in October temperature.

The year 2020, like 2019, had a very warm spring, and this resulted in the earliest United Kingdom first leaf date in the 20-year series (10 days earlier than the in-situ baseline).

October temperature was similar to recent years, and the bare tree date (note these were predicted from the temperature relationship due to COVID-19 monitoring restrictions) was approximately twodays later than the baseline.

Professor Tim Sparks, speaking on behalf of the Woodland Trust, said: “The net result was a United Kingdom “oak season” 12 days longer than the baseline. The earlier spring and later autumn (fall) vegetation was associated with warmer than average temperatures during these seasons. Nature is having to keep pace with rapid changes – perhaps never more rapid.

“However, not all species are changing at the same rate. Whilst some species can take advantage of a warmer climate, for others climate change will be a further threat to their existence.”

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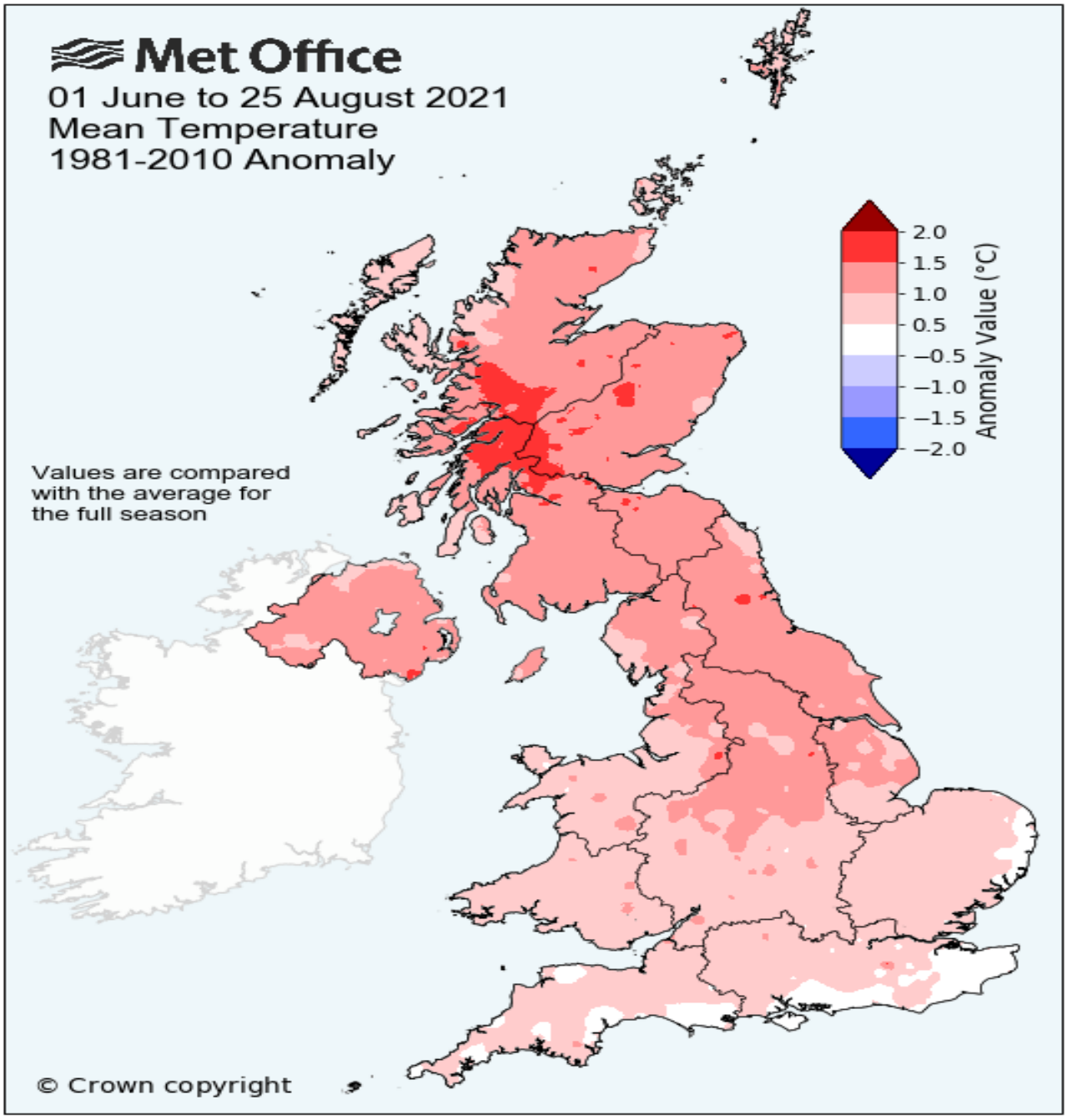
August 2021

Notably warm summer so far for UK – but not for everyone

Description

The summer so far has been around 1°C warmer than average for the UK, which would potentially place it within the top ten warmest summers on record, but it’s still too early to make a confident statement about final rankings. This may come as a surprise to some, especially for those in the southeast and London, who have had a much wetter and duller summer than average, with many areas seeing more than 50% more rainfall than their long-term averages.

With a few days still to go until the full figures are published for summer 2021 at the start of September, high temperatures in Scotland and Northern Ireland have helped pull the UK to within the top 10 for warmest summers according to mean temperature, with still some room for manoeuvre before the season is out. The UK has a mean temperature for summer around a degree higher than the average, currently sat at 15.4°C, with still some time to change.



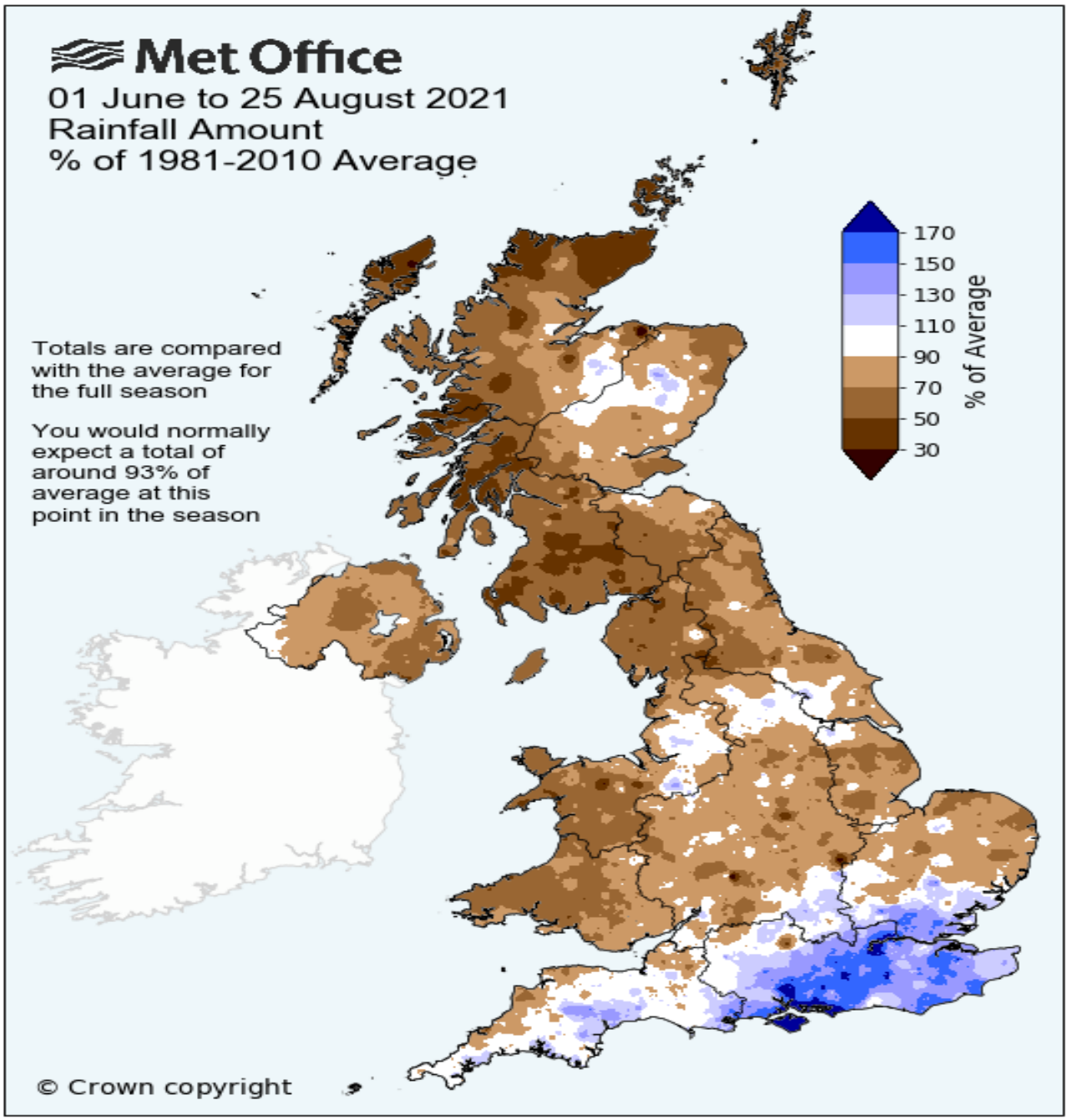
Average mean temperatures for the UK for summer so far.

In fact, Northern Ireland has so far seen one of its warmer summers using the same measurement (15.0°C), and Scotland (13.8°C) has also been notably warm. Western areas, and especially western Scotland, have also seen much less rainfall than the averages, with Scotland, so far, seeing just 62% (188.1mm) of its average rainfall for the season, and Wales 66% (189.5mm).

With the best of the dry and warm conditions to be found in northern and western areas of the UK, it has been a markedly different story for the southeast and some southern areas this summer so far.

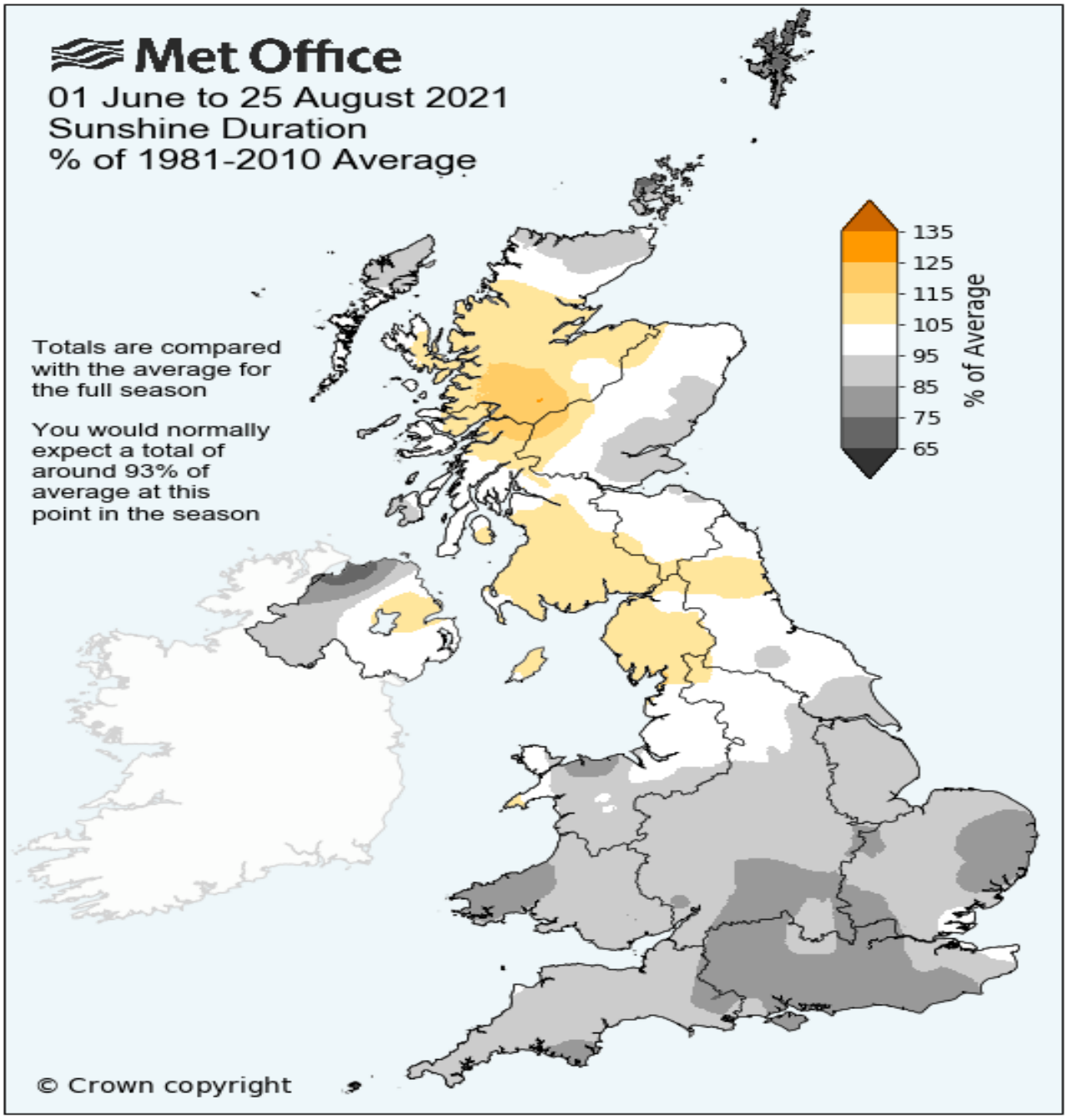
Greater London has so far seen an average of 220.2mm of rain, which is 48% more than their long-

term average for summer, although not enough to trouble the all-time records for the area. They're joined by Hampshire (245.2mm, 49% more than average), Surrey (240.3mm, 54% more than average) and West Sussex (250.9mm, 52% more than average) in seeing significantly more rain than their usual summer conditions.



Rainfall amounts versus the long term average for summer so far.

As you might expect, these areas have also seen less of the sun than average, although there is still time in the season for this to shift more with some good spells of sunshine expected before the end of the month.



Sunshine duration for the UK versus the long term averages

Of course, this summer did see a heatwave in July, which saw the Met Office issue its first ever amber extreme heat warning, as Northern Ireland broke its all-time temperature record on 21 July with 31.3°C recorded at Castlederg. This extended spell of warm weather in July, with stubbornly high night-time temperatures, has helped to lift the averages for the season, with the highest temperatures in that period also seen over western areas, although the rest of the UK was widely warm.

However, perceptions that summer has been below average for some could come from the fact that August hasn't yet served up particularly high individual maximum temperatures. So far, the highest temperature recorded this month was at Tyndrum, Scotland with 27.2°C. Only two times in the last ten

years has 30°C not been reached in August in the UK and on every occasion in the last 20 years the highest temperature for August was reported in England.

Temperatures have, however, been fairly consistent over the month of August. So, although there hasn't been any creeping up past 30°C just yet, the average maximum temperature is actually near to the long-term average at the moment, at 19.1°C. August has also been slightly drier than average so far for most, although some regions are close to or above average such as Northern Ireland, eastern Scotland and parts of southeast England.

Dr Mark McCarthy of the National Climate Information Centre said, "Obviously there's still time before the month and season is over, but summer so far is certainly looking drier and warmer than average, that's despite some of the wet, dull conditions we've seen in the southeast in particular.

"Some of the flooding seen in London in July has seen some individual stations report almost twice their normal summer rainfall but the north and west of the country has experienced plenty of sunshine through June and July, although most of the country has been duller than average through August."

Get the latest forecast for the rest of the month on the Met Office website.

Note: Statistics in this blog are representative of the period to 25 August 2021. The full statistics will be released at the end of the month. Summer, as defined in these statistics, runs from the 1 June.

Date Created
August 2021